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XXIX.—*Bryozoa from New South Wales, North Australia, &c.* By ARTHUR WM. WATERS.

[Plate VII.]

PART III.

CYCLOSTOMATA.

When describing fossil Cyclostomata I have had repeatedly to point out how little is known about this suborder, and how few characters there are that can be used in diagnosis. The mode of growth has always been placed in the front rank; but this in other divisions has been clearly shown to have secondary importance, and the same thing may to a certain extent be seen here, for there is *Lichenopora* in both single and confluent colonies and also occurring in many layers. Then, again, *Lichenopora* and *Discotubigera*, as *D. lineata*, are very similar in appearance, but the structural differences indicate that they should be widely separated.

In the Quart. Journ. Geol. Soc. vol. xliii. p. 337, I proposed to divide the Cyclostomata into Parallelata, in which there are no cancelli, and Rectangulata, in which the openings of cancelli occur between the zoecial tubes. Probably the

Lichenoporidae and some other families will never be brought into order until the ovicells have been studied in most species, whereas it is astonishing how seldom they have been recorded. This I attribute largely to insufficient search, although often large numbers of specimens may be examined without any ovicells being found; and it is therefore very satisfactory that the present collection enables me to add descriptions of several instances of interesting ovicells. I have also recorded the very interesting discovery of short spines, with knobs, on the outside of the zoarium and ovicells of *Lichenopora grignonensis*, similar to the rays in the inside of the zoecia. This seems to add to the difficulty of understanding these spines; and we may ask whether the long hair-like spines on *L. ciliata*, *L. echinata*, and *L. pristis* are homologous.

I have referred specially to the family Lichenoporidae, believing that there is no other which is so likely to throw light on the natural classification and relationship of a large part of the Cyclostomata as this, and the similarity of structure with *Heteropora* &c. makes it possible it may ultimately clear up several obscure palaeontological questions*. The size of the lamina upon which it grows does not seem to have any specific value, and the figures now given show how largely the shape of the peristome varies in the same specimen. Other characters have not been sufficiently studied for us to know how far they are variable.

75. *Crisia eburnea* (L.).

For synonyms see Hincks, Brit. Mar. Pol. p. 420, pl. lvi. figs. 5, 6; Pergens, Plioc. Bry. v. Rhodos, p. 3; and Woods, Trans. Roy. Soc. Vict. 1865, vi. p. 5, pl. i. fig. 12.

A small fragment from Shark Island, Port Jackson, 8 fath., certainly seems to be this species; but a determination where there are no ovicells is never very satisfactory.

76. *Crisia Edwardsiana*, d'Orb.

Crisia Edwardsiana, d'Orb. Voyage dans l'Amér. Mérid. p. 7, pl. i. figs. 4-8; (?) Busk, Cat. Mar. Pol. pt. iii. p. 5, pl. ii. figs. 5-8; MacGillivray, Zool. Vict. dec. iv. p. 37, pl. xxxix. fig. 1.

The fragment from La Pérouse is small, but there is no doubt that it is this species. The joints of the internodes and of the spines are black. This piece has no ovicells; but

* I shall be much obliged to Australian or other authors who can let me have authentic specimens of described species in various stages of development.

a specimen from New Zealand has the opening of the ovicell low down on the dorsal surface.

Loc. Patagonia; Tierra del Fuego (?); New Zealand; Victoria; La Pérouse; Botany Bay, New South Wales, washed on shore.

77. *Idmonea radians* (Lamk.), non Deifr.
(Pl. VI. figs. 27, 28.)

Retepora radians, Lamk. Anim. sans Vert. ii. p. 183.

Idmonea radians, M.-Edw. Ann. Sc. Nat. 2nd ser. vol. ix. p. 217, pl. xii. fig. 4; Stoliczka, Foss. Bry. der Orakei Bay, p. 116, pl. xviii. figs. 9, 10; Busk, Cat. Mar. Pol. pt. iii. p. 11, pl. vii. figs. 1-4; Waters, Quart. Journ. Geol. Soc. vol. xl. p. 684; MacG. Zool. Vict. dec. vii. p. 30, pl. lxxviii. fig. 3; Haswell, Proc. Linn. Soc. New South Wales, vol. iv. p. 351; Busk, 'Challenger' Report, pt. ii. p. 10.

I have already (*loc. cit.* p. 676) referred to a structure of the ovicell which seems to have been overlooked by other writers, and now give a figure showing the finely perforated lateral plates. The ovicells are elongated raised protuberances, occurring at a bifurcation, divided up by irregular ridges, between which are large pores deeply pitted, and on each side there are usually two, but sometimes one or three, plates, distinctly bordered and with numerous extremely fine perforations.

The ovicells of the Cyclostomata have nearly always the surface covered with much more numerous pores than the rest of the zoarium; and it is therefore most interesting, and no doubt a fact of considerable physiological importance, that in some cases it is only a part of the ovicell which is provided with these numerous pores.

Loc. Fossil: Mount Gambier (?); Orakei Bay. Living: New Zealand; Tongatabu, 18 fath.; Honolulu, 20-40 fath.; Victoria; Port Jackson (*H.*); Adelaide (*A. W.*); Vacluse Point; Port Stephens, 5-6 fath.; Green Point, 8 fath., New South Wales, and Darnley Island, Torres Straits, 10-30 fath. (all dredged by *Brazier*).

78. *Idmonea* (?) *irregularis*, Meneghini (non Beissel).

Idmonea irregularis, Menegh. "Polipi della fam. dei Tubul.," Accad. di Sc. di Padova, vol. vi. 1844, p. 12; Waters, Ann. & Mag. Nat. Hist. ser. 5, vol. iii. p. 270; Busk, Chall. Rep. p. 14; Haswell, Heller.

Tervia Folini, Jullien, "Dragages du Travailleur," Bull. Soc. Zool. de France, t. vii. p. 5, pl. xiii. figs. 8, 9.

Specimens from Holborn Island have the oral aperture 0.1 millim. wide. I do not consider that this can remain under *Idmonea*, seeing that the ovicell is dorsal, occurring near a

dichotomization (see Quart. Journ. Geol. Soc. vol. xl. p. 687). In shape it resembles the ovicell of *Crisia* (say *Crisia Houldsworthii*, B., Chall. Rep. pl. iii. fig. 2), but as yet I have only seen it upon the Mediterranean specimens.

Loc. Naples; Adriatic; Tortugas; Bay of Biscay, 2651 metres; Holborn Island (*Hasw. & W.*); Azores, 450 fath. Fossil: Testa del Prado, Calabria (*W.*); and Zanclian, Astian, Sicilian, and Saharian (*Sequenza*).

79. *Idmonea Milneana*, d'Orb.

For synonyms see Waters, Quart. Journ. Geol. Soc. vol. xl. p. 684, and add Busk, 'Challenger' Rep. p. 13.

Tubulipora Dawsoni, Hincks, Ann. & Mag. Nat. Hist. ser. 5, vol. xiii. p. 34, pl. ix. fig. 5.

The branches of a specimen from Green Point anastomose, forming a colony an inch and a half across, and it differs in the branching from *I. interjuncta*, where tubular connexions are thrown across from one branch to another, also the radicles growing from the back of the branches of *I. Milneana* are stouter, being formed of a fasciculus of tubes. The ovicell and the ovicellular opening of this and *I. interjuncta* seem identical (see figure 29 on Pl. VI.), the ovicell being very slightly raised, spreading among a considerable number of zoecia; the opening is wide, with a raised compressed funnel. Aperture of zoecial tube 0.2 millim. wide.

Mr. Busk, in his 'Challenger' Report, says "ovicell unknown;" but this I have previously described from Capri. I have reexamined the British-Museum specimens of *I. notomale*, B., and have no doubt of this being only a synonym; in fact the Museum specimens of the latter and *I. Milneana* are so similar that they might well be fragments of the same colony.

Loc. Living: Falkland Islands (*d'Orb.*); Patagonia, 30 fath.; Chonos Archipelago; Florida; S. W. Chili, 0-30 fath.; Capri; New Zealand (*A. W. W.*); Heard Island, 75 fath.; Prince Edward Island, 80-150 fath.; Fiji Islands, 450 fath.; Queensland; Victoria; Green Point, Port Jackson, 8 fath. Fossil: Latdorf (Oligocene); Orakei Bay, New Zealand; Mount Gambier, Curdie's Creek, Bairnsdale (Australia).

80. *Idmonea interjuncta*, MacG. (Pl. VI. fig. 29.)

Idmonea interjuncta, MacG. Descrip. of New or Little-known Polyzoa, pt. ix. (1885), Trans. Roy. Soc. Vict. p. 10 (sep.).

? *Idmonea Pebleyi*, Haswell, "Cyclost. Polyzoa of Port Jackson," Proc. Linn. Soc. N. S. Wales, vol. iv. p. 351.

Specimens from Green Point correspond entirely with MacGillivray's description; but I believe that Haswell's name, which has priority, ought to be adopted, though as long as there is any uncertainty it is better to adhere to *interjuncta*.

It forms a subglobular intricate mass nearly two inches across, made up of slender branches, which dichotomize and are attached to one another by delicate tubes thrown across from neighbouring branches: similar tubes are often thrown out as long delicate rootlets; these tubes are usually single, but sometimes in bundles. The zoecia are smaller than those of *I. Milneana*, the aperture only measuring 0·14 millim., and the dorsal striation is more distinct in these specimens than in *I. Milneana* from the same locality. The ovicell, as shown in the figure, is an inflation occurring usually at the junction of the branches, and embraces many zoecia; the surface of the ovicell is more finely punctured than that of the zoecia, and the aperture is wide, with a raised funnel-shaped peristome.

It will be seen in figure 29 that the middle connecting-tube passes from the right-hand branch to the left, whereas the other two arise from the left- and are attached to the right-hand branch.

Kirchenpauer describes (Mus. Godeffroy Cat. iv. p. xxxiii) similar connexions in *Idmonea flabellata*, from the Gulf of St. Vincent.

Loc. Port Phillip Heads (*MacG.*); Green Point, Port Jackson, 8 fath.

81. *Filisparsa tubulosa* (Busk).

Hornera violacea, var. *β. tubulosa*, Busk, Cat. Mar. Pol. pt. iii. p. 19, pl. xviii. fig. 4.

Filisparsa tubulosa, Waters, Ann. & Mag. Nat. Hist. ser. 5, vol. iii. p. 275.

Filisparsa Delvauxi, Pergens, "Pliocene Bry. von Rhodos," Ann. k.-k. Hofmus. vol. ii. p. 6.

Idmonea gasparensis, MacG. "New or Little-known Polyzoa," pt. xii., Trans. Roy. Soc. Vict. p. 7 (sep.), pl. ii. fig. 3.

Filisparsa, sp., Manzoni, Mém. de la Soc. Géol. de France, 3^e sér. vol. i. pt. ii. p. 69, pl. iii. figs. 18 a and 18 b.

There is one piece from Holborn Island, 20 fath., which is more delicate than *I. irregularis* and has fewer zoecia. The oral aperture is 0·15 millim. wide. There is no ovicell, but my specimens from Naples have ovicellular enlargements embracing several zoecia near a new branch on the front surface. The numbering of Busk's figures in his description and his explanation of the plates does not correspond, and it is very difficult to know what was meant.

A fossil, which I described as *F. orakeiensis*, Stol. (Quart. Journ. Geol. Soc. vol. xl. p. 687), from Mount Gambier, with oral aperture about half the size, has the ovicell on the dorsal surface, in this respect corresponding with *I. irregularis*, Menegh., and from this it will be seen that there is considerable uncertainty in the determination when the ovicell is not preserved.

It would seem that *I. irregularis* and *F. orakeiensis* should be removed to another genus on account of the position of the ovicell. There is also *Hornera tubulosa*, Meneghini, which may be this species.

Loc. Naples (*W.*); Victoria (*MacG.*); Holborn Island, Queensland, 20 fath. Fossil: Rhodes.

82. *Tubulipora fimbria*, Lamk.

There are two small pieces from Bondi Bay, Sydney, which do not seem to differ in size of the zoecial tubes or the arrangement of the zoecia from the European species; but from small pieces the specific determination is doubtful. The ovicells are inflations near the end, with wide funnel-shaped openings.

83. *Tubulipora fimbria*, Lamk., forma *pulchra*, MacG. (Pl. VII. figs. 1, 2, 3.)

Type *Tubulipora fimbria*, Lamk. Hist. Anim. sans Vert. ed. 1, vol. ii. p. 163; and for synonyms see Hincks, Brit. Mar. Polyz. p. 448, pl. ix. fig. 3, and Busk, 'Challenger' Rep. p. 23, pl. v. fig. 2.

Tubulipora pulchra, MacGillivray, Trans. Roy. Soc. Vict. vol. xxi. p. 95, pl. ii. fig. 1.

There are a large number of specimens from Vacluse Point, which have grown upon seaweed and have a very interesting attachment. The primitive disk has small dentate projections all round, and besides these there are all over the dorsal surface broad tubular teeth at short intervals, arranged in curved lines following the outlines of the zoecia. Mr. Busk, in "Zool. of Kerguelen Island," Trans. Roy. Soc. vol. clxviii. p. 19, pl. x. figs. 20-25, records a similar denticulate border of the primary disk of what he considers *T. organizans*, d'Orb., but does not mention any other attachment. *Idmonea serpens* also throws out dentate processes from the side of the zoarium, but they can scarcely be compared with those now described.

The zoarium is flabelliform, with sometimes two or three lobes; but none of the specimens are large or are much divided. The aperture of the zoecia is only 0.07-0.08 millim.

wide inside and about 0·1 millim. outside, which is not much more than half the size of that of European *T. fimbria*, and the ends are slightly contracted, but not anything like so much as in MacGillivray's figure of *T. pulchra*; in fact, without careful examination the contraction would be overlooked. The ovicells are inflations near the border embracing many zoecia, and with wide, irregular, funnel-shaped openings.

The zoecial tubes are punctured, except at the ends, where there are few or no punctures. With *T. flabellaris* and *T. fimbria* there has been some confusion, which is not lessened by strictly following zoological rules. Johnston, Busk, Hincks, &c. had called what we now consider *T. fimbria* *T. flabellaris*; but Smitt showed that this was wrong, and that *T. flabellaris* of Fabricius was what Couch, Busk, Hincks, Waters, &c. had called *T. phalangea*; so that both species have in well-known works been called *flabellaris*, and when, as in the present instance, MacGillivray refers to *T. flabellaris* it is impossible to know which species is meant.

Typical *T. fimbria* occurs abundantly in European and northern seas, and is recorded from a few localities in the southern hemisphere. *T. pulchra* is found in Victoria, but MacGillivray does not say where. Vaucluse Point, Port Jackson, 5 fath. (dredged by *Brazier*).

84. *Entalophora fragilis* (Hasw.).

Pustulipora fragilis, Haswell, "Polyzoa from the Queensland Coast," Proc. Linn. Soc. New South Wales, vol. v. p. 35.

There are numerous fragments from Darnley Island of a very delicate *Entalophora*, with the zoarium about 0·5 millim. in diameter, with few zoecia, separated by wide intervals.

I do not find any black-pointed spinules; but this may arise from the state of preservation, or it may be a varietal character. The aperture of the zoecium is about 0·1 millim.

Loc. Holborn Island, Queensland (*H.*); Darnley Island, Torres Straits, 10–30 fath.; and Princess Charlotte Bay, N.E. Australia, 13 fath.

85. *Fasciculipora bellis*, MacG.

Fasciculipora bellis, MacGillivray, Trans. Roy. Soc. Vict. vol. xx. p. 127, pl. i. fig. 2.

From the Bottle-and-Glass Rocks there is a specimen with more than thirty erect fasciculi. Each fasciculus rises from a concentric calcareous crust, which is punctured with rather large pores; and these basal crusts usually become confluent, and sometimes have a few zoecial openings, and also on the

sides of the fasciculi there are zoöcial apertures, so that in places it looks like a little forest of *Entalophora*.

It is a question whether this is a complete growth, or only the young form of a growth like *Fuscularia tubipora*, and from one piece this cannot be decided.

Loc. Port Phillip Heads; Bottle-and-Glass Rocks, Port Jackson, 8 fath., "rocky bottom" (*Br.*).

86. *Mesenteripora repens*, Haswell.
(Pl. VII. figs. 6 & 7.)

Mesenteripora repens, Haswell, Proc. Linn. Soc. N. S. Wales, vol. vi. p. 199.

Some specimens from Watson's Bay spread over *Cellepora* &c., forming layers several inches across. On the basal portion the zoöcial divisions are scarcely visible, and the zoöcial tubes are mostly closed by a cover with a projecting tubule, but near to the raised ridges the zoöcia project and are more or less free; and from the ridges themselves they project a considerable distance, with a bilabiate peristome. I have also a specimen of *Mesenteripora* from Port Phillip in which the zoöcia on the basal crust are distinct and free at the end, with covers having an excentric projecting tubule, and the zoöcia are not formed into long elevated ridges, but rise up about 3-4 millim. as small compressed stalks with a lamina in the middle along the longer axis.

Mesenteripora repens, with its beautiful white punctured surface, is a very attractive object.

Loc. Broughton Island, New South Wales (*H.*); Watson's Bay, Port Jackson, "under stone" (sent by *Brazier*).

87. *Discotubigera* (?) *lineata* (MacG.).
(Pl. VI. fig. 24.)

Diastopora lineata, MacGillivray, Trans. Roy. Soc. Vict. vol. xxi. p. 96, pl. iii. fig. 1.

Liripora lineata, MacG. Cat. Mar. Polyzoa of Vict., Roy. Soc. Vict. 1887, p. 32.

All my specimens are surrounded by a broad lamina, and the central cells are closed by a perforated membrane; the series of zoöcia are very much raised near the border. In two specimens the zoarium is regularly discoid, about 5 millim. in diameter—one from Port Phillip spreads irregularly over a space of about $\frac{3}{4}$ inch, forming strap-shaped lobes. The ovicells occur as tangential swellings near the border, and have a round tubular opening at the base.

The zoarial appearance is much the same as that of *Lichenopora*, but there are no interstitial pores, and the structure is

of course quite different; but so long as we are in a tentative stage with the Cyclostomata I do not see that a form in which the zoecia are gathered so distinctly into rays or ridges can at present be united with *Diastopora*.

This is no doubt nearly allied to the fossil from Aldinga which I described as *Discotubigera clypeata*, Lamx. (Quart. Journ. Geol. Soc. vol. xl. p. 690, pl. xxxi. figs. 15, 16, 19).

Loc. Port Phillip and Port Phillip Heads; Double Bay, Port Jackson, "under stones."

88. *Lichenopora novæ-zelandiæ* (Busk).
(Pl. VII. fig. 8.)

Discoporella novæ-zelandiæ, Busk, Cat. Mar. Pol. pt. iii. p. 32, pl. xxx. fig. 2; Haswell, Cyclost. Polyzoa from Port Jackson, Proc. Linn. Soc. New South Wales, vol. iv. p. 353.

The description of Busk leaves it somewhat uncertain as to whether this is the species intended, and where the ovicell is undescribed this will often be the case.

Where there is no ovicell the zoecial tubes run into the centre, the central depression forming an inverted cone without cancelli; in this respect these specimens differ from Mr. Busk's figure. The outer cancelli are formed of bars from the radii, and there is usually only one row of cancelli between the radii. The inner side of the peristome is the longer, sometimes the outer zoecia have the peristome wide and acuminate in the centre. The ovicell is considerably raised and occupies the whole of the centre; the central portion is flat and is bounded by a raised meandering ridge, from which the sides slope steeply down. The aperture of the ovicell is near one end of the flat space and is semicircular. On the lower left-hand side of the specimen figured there is a tube which I do not understand, but probably it is a zoecial tube irregularly placed. Zoecial aperture about 0·07 millim. in diameter.

Loc. New Zealand (B.); Port Jackson (*Haswell*); Bondi Bay, near Sydney, New South Wales.

89. *Lichenopora Houldsworthii* (Busk).

Discoporella Houldsworthii, Busk, Cat. Mar. Pol. pt. iii. p. 33, pl. xxx. fig. 4.

Lichenopora Houldsworthii, Waters, Quart. Journ. Geol. Soc. vol. xliii. p. 347.

There is a specimen from Watson's Bay with the cancelli about 0·07 millim. and the zoecial apertures nearly as large. In the interior of both zoecial tubes and cancelli there are numerous radiating spines with a nodular termination, the

exact shape of which I have not had the opportunity of making out.

Loc. Living: Ceylon (*B.*); Port Phillip Heads (*MacG.*), Port Western, Victoria; north side of Watson's Bay, "under stones," Port Jackson. Fossil: Waipukurau, New Zealand.

90. *Lichenopora grignonensis* (Busk).

(Pl. VII. fig. 4.)

Discoporella crassiuscula, Smitt, *Œfver. K. Vetens.-Ak. Förh.* vol. xxiii. pp. 406 and 482, pl. xi. figs. 7-9.

Discoporella grignonensis, Busk, *Crag Polyzoa*, p. 116, pl. xx. fig. 4.

Lichenopora grignonensis, Ridley, *Zool. Coll. of H.M.S. 'Alert,' Proc. Zool. Soc.* 1881, p. 57, pl. vi. fig. 2.

Lichenopora canaliculata?, Busk, *Phil. Trans.* vol. 168 (ex.), p. 199, pl. x. figs. 12-14.

I have figured a specimen from Vaucluse Point, showing the great variation in shape of the zoecial orifices, which near the periphery have usually projections at the two sides, forming what Ridley calls a sinus, in the central zoecia, and have the inner side much raised, but also divided by a sinus; the outer side is also raised often into a pointed process. Zoecial opening about 0.08 millim. The central zoecia are much raised, and when there is no ovicell nearly meet in the depressed centre of the zoarium. The ovicell covers the central area and is formed by a network of trabeculæ, the interspaces of which are closed by a calcareous perforated crust. The sides of the zoecia have nodulated ridges, the nodules sometimes becoming bluntly spinous.

In the interior of the zoecia there are radiating spines with knobs at the end, but also on the outside of the zoecia there are similar spines projecting from the trabeculæ. This is the first time, so far as I am aware, that these spines have been recorded from the outside of the zoarium, which seems to make it more difficult to understand what their function can be.

I have a specimen from the Semaphore, Adelaide, in which the nodulated ridges are much more distinct and the inner part of the peristome is much raised, whereas the portion turned towards the periphery of the zoarium is deeply cut away; another specimen from the same locality has the nodulated ridges also well marked, but the peristome is nearly round and entire, as figured by Busk in his *L. canaliculata*.

I cannot see that there is sufficient ground for identifying Busk's species with that of Milne-Edwards, and think that *L. canaliculata*, Busk, is probably the same as the Crag fossil; but since the shape of the aperture is figured as being

different I hesitate either to unite them or to give a new name, and therefore follow Ridley in regarding this as Busk's species, since I am not certain that *L. crassiuscula*, Smitt, is identical, whereas there is no doubt that this is the species described by Ridley.

In the figures of both this and *L. ciliata* I have not shown the convex shape of the zoarium, in order that the variations in the peristome might be clearly seen.

Loc. Living: Sandy Point (*R.*); off Vaucluse Point, Port Jackson, 5 fath., and Bondi Bay, New South Wales; Bahusia (?) (*Sm.*). Fossil: Crag (?).

91. *Lichenopora ciliata* (Busk). (Pl. VII. fig. 5.)

Discoporella ciliata, Busk, Cat. Mar. Pol. pt. iii. p. 31, pl. xxx. fig. 6, and pl. xxxiii. fig. 4; Haswell, Cyclost. Polyzoa from Port Jackson, p. 354.

In a specimen from Port Stephens the zoecia are irregularly arranged, or in parts indistinctly radial, and the inner edge is prolonged, usually with a deep notch in front, forming an apparent sinus; sometimes the peristome is divided into several processes, and in some cases the zoecial tubes can be seen to be slightly ridged. Zoecial aperture about 0.07 millim. diameter. There are numerous long hair-like spines growing from all parts of the zoecial tube and some from the central cancelli. The ovicell spreads among a number of zoecial tubes and opens with a long inflated tube directed towards the centre of the zoarium.

It will be seen that this approaches very closely to *L. grignonensis*, and that it differs from *L. echinata*, MacG., in not having rounded central cancelli, from *L. complicata*, Haswell, in not having the peristome round and entire, and from *L. reticulata*, MacG., in not having the peristome produced on the inner border but on the outer. I have a specimen from Port Phillip which agrees with this in having the central portion reticulated, and has similarly numerous long spines; another one from the same locality is similar in regard to the arrangement of the zoecia, the shape of the zoecial tubes, and the peristome; but the large rounded central cancelli are closed with a perforated pellicle, and above this there is the commencement of a thin, calcareous, perforated, plain crust, which is, no doubt, the commencement of an ovicell. There are in this last specimen a few long spines from the cancelli, but none from the surface of the zoecial tubes.

Ought not *L. ciliata* to be considered a variety of *L. verrucaria*, Fab.?

Loc. Cape of Good Hope; New Zealand (B.); Port Stephens, New South Wales (sent by *Brazier*).

CTENOSTOMATA.

92. *Amathia semispiralis*? (Kirchenpauer).

Serialaria semispiralis, Kirch. Cat. Mus. Godeffroy, iv. p. xxxiv.
Amathia semispiralis, Busk, Chall. Rep. p. 86, pl. viii. fig. 3.

There is a small dried fragment of *Amathia* from Darnley Island, Torres Straits, in which the zoecia are arranged spirally, but are broken up into groups, and in our present state of knowledge we may doubt whether this should be separated from *A. semiconvoluta*.

There is also an *Amathia* found in Naples which has the zoecia arranged spirally, but only has zoecia in the upper half of the internode. This Kirchenpauer called in manuscript *A. distans*—a name since given by Busk to another species.

93. *Amathia biseriata*, Krauss. (Pl. VI. fig. 25.)

Amathia biseriata, Krauss, Corallineen und Zoophyten der Südsee, 1837, p. 23, fig. 1.
Serialaria Woodsii, Goldstein, Quart. Journ. Micr. Soc. Vict. vol. i. no. 1, p. 20, pl. iii. fig. 5.

This species is attached by thick bundles of radical tubes, as described and figured by Krauss, but my specimens have not such a mass of root as he shows. The number of zoecia is not constant, about eight pairs is the most usual, but I have counted thirteen pairs, and the zoecia usually occupy about four fifths of an internode, though sometimes almost the entire internode is filled up.

Tenison Woods in his list of works on *Amathia* does not mention Krauss, so that probably both he and Goldstein were unacquainted with his work.

This is allied to *A. lendigera*, L., but differs in having shorter internodes more closely filled up. The earlier writers all seem to have described and figured *A. lendigera* as having only a single series of zoecia; but Hincks, Busk, &c. now speak of its having a double series, and European specimens in my collection have two series.

I have *A. lendigera* from Cape Agulhas, South Africa.

In *A. biseriata* a radicle is often thrown out from the under surface of the branches (see fig. 25).

Loc. Australia (K.); Portland, Victoria (G.); mouth of Lane Cove River, 7 fath., N. S. Wales, and Shark Island, 8 fath.

Since the previous part was written I have found a fragment of *Membranipora cervicornis*, B., from Shark Island, 8 fath., and I also overlooked Kirchenpauer's paper in the Proc. Linn. Soc. New South Wales, vol. ix. 1884, in which mention is made of *Catenicella ventricosa*, *C. Buskii*, *Cellularia cuspidata*, *Menipea crystallina*, from the coast near Mount Dromedary, and of *Didymia simplex* and *Bugula dentata* near the entrance of the Richmond River.

Besides the seventy-nine species now recorded from New South Wales there are forty-three more described by Kirchenpauer, Busk ('Challenger' Report), and Haswell; but there are still many species that are common in the other colonies and neighbouring seas which have not yet been recorded from New South Wales, though probably, when anyone, following MacGillivray's example, studies the Bryozoa as carefully and systematically as he has done in Victoria, the two colonies will be found to have an equally rich fauna.

EXPLANATION OF PLATE VII.

- Fig. 1. *Tubulipora fimbria*, Lamk., var. *pulchra*, MacG., $\times 25$.
 Fig. 2. *Tubulipora fimbria*, Lamk., var. *pulchra*, $\times 85$, showing central zoecia and dorsal attachments.
 Fig. 3. *Tubulipora fimbria*, Lamk., var. *pulchra*, $\times 25$, showing dorsal attachments of colony.
 Fig. 4. *Lichenopora grignonensis* (Busk), $\times 25$, from Vacluse Point.
 Fig. 5. *Lichenopora ciliata* (Busk), $\times 25$, from Port Stephens.
 Fig. 6. *Mesenteripora repens*, Haswell, $\times 16$.
 Fig. 7. *Mesenteripora repens*, Haswell, natural size.
 Fig. 8. *Lichenopora novæ-zelandiæ* (Busk), $\times 25$, from Bondi Bay.

XXX.—Descriptions of eight new Species of Asiatic Butterflies. By H. GROSE SMITH.

Appias Lalassis.

Male.—*Upperside.* Both wings white. Anterior wings falcate, with a small black spot at the end of the cell, the apex and outer margin as far as the second median nervule irrorated with black.

Underside. Anterior wings white, the spot at the end of the cell larger than on the upperside; a spot between the lower discoidal and first median nervules; apex pale pinkish brown. Posterior wings pale pinkish brown, shaded with indistinct brown markings.

Female.—*Upperside* with the apex of the anterior wings